

ECONOMIC VALUE OF USING ENSO PHASE INFORMATION FOR WATER-STRESS MANAGEMENT AMONG SMALL-HOLDER CROPPING SYSTEMS IN ZIMBABWE

L.S. Unganai, W. Jogo, T. Bandason and J. Dimes

Abstract

High inter-annual rainfall variability is the major cause of rain-fed crop yield and income fluctuations among smallholder farmers in Zimbabwe. The farmers' over dependence on a single crop, maize (*zea mays*) for livelihoods increases their vulnerability to climatic shocks. Despite recent advances in seasonal climate forecasting science, managing crop production risks associated with inter-annual climate variability has not yet become a significant feature of the Zimbabwe agriculture system particularly among small-holder farmers. A National Oceanic and Atmospheric Administration, Office of Global Program (NOAA-OGP) and the United States Agency for International Development's Office for Foreign Disaster Assistance (USAID-OFDA) supported pilot project was implemented in selected study sites in Zimbabwe under the Southern African Development Community's (SADC's) Drought Monitoring Centre outreach program to:

- Assess the value of applying seasonal climate forecasts in small-holder cropping systems management in Zimbabwe;
- Develop an appropriate operational framework for connecting seasonal climate forecasts with cropping systems management in a variable Zimbabwe climate.

Fields surveys were implemented in three successive cropping seasons (1999/2000, 2000/2001 and 2002/2003) to establish the socio-economic and agricultural systems setting of the smallholder farmers in Zimbabwe. APSIM, a crop simulation model was then used to generate data for different crop management strategies under three El Nino Southern Oscillation (ENSO) states (warm, neutral and cold) for the period 1961 to 2002. The economic value of ENSO based seasonal forecasts is estimated from the difference in gross margins from the with- and without ENSO information scenarios.

It is concluded that smallholder farmers who adjust their cropping plans in response to ENSO phase shifts stand to benefit in the long-term. Response to the neutral ENSO phase yields higher positive economic returns compared with the other phases. The value of ENSO phase information to the smallholder farmer is estimated to range from US\$10 to \$80 per hectare during the neutral phase. However these estimates are only approximate since only prices of seed, fertilizer and output were considered in the gross margin calculations. Lack of economic gain during the El Nino phase suggests that the risk management options used may not be appropriate to manage drought.

An important lesson learned in this study is that climate risk management may require an integrated approach. Integration is required, *inter-alia*, across policy, institutions, and

disciplines and geographical regions. Integrated national climate risk management programmes must therefore be promoted.